

**What Is Claimed Is:**

1                   1.     A method for aligning a micro-gyroscope having closed  
2 loop control of drive, output and sense axes, said method comprising the steps  
3 of:

4                   detecting misalignment of said micro-gyroscope; and  
5                   correcting misalignment to zero by an electrostatic bias  
6 adjustment.

1                   2.     The method as claimed in claim 1 wherein said step of  
2 detecting misalignment further comprises detecting misalignment by way of  
3 quadrature signal amplitude obtained by demodulation of a signal of said output  
4 axis using a signal in quadrature to rate signal for said drive axis.

1                   3.     The method as claimed in claim 1 further comprising the  
2 step of nulling an in-phase bias.

1                   4.     The method as claimed in claim 3 wherein said step of  
2 nulling an in-phase bias further comprises nulling by electronically coupling a  
3 torque component of said drive axis with said output axis.

1                   5.     A method for tuning a cloverleaf micro-gyroscope having  
2 closed loop control of drive, output and sense axes, said method comprising the  
3 steps of:

4                   detecting residual mistuning by way of a signal; and  
5                   correcting said residual mistuning to zero by way of electrostatic  
6 bias adjustment.

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1                   6.     The method as claimed in claim 5 wherein said step of  
2     detecting residual mistuning further comprises detecting by way of a quadrature  
3     signal noise level.

1                   7.     The method as claimed in claim 5 wherein said step of  
2     detecting residual mistuning further comprises detecting by way of a transfer  
3     function test signal.

1                   8.     A method for independently aligning and tuning a  
2     cloverleaf micro-gyroscope having closed loop control of drive, output and  
3     sense axes, said method comprising the steps of:  
4                   detecting misalignment of said micro-gyroscope by way of a  
5     quadrature signal amplitude;  
6                   correcting said misalignment to zero by way of an electrostatic  
7     bias adjustment;  
8                   detecting residual mistuning by way of a signal; and  
9                   correcting said residual mistuning by way of an electrostatic bias  
10    adjustment.

1                   9.     The method as claimed in claim 8 wherein said step of  
2     detecting a residual mistuning further comprises detecting a residual mistuning  
3     by way of a quadrature signal noise level.

1                   10.    The method as claimed in claim 8 wherein said step of  
2     detecting a residual mistuning further comprises detecting a residual mistuning  
3     by way of a transfer function test signal.

1                   11.    The method as claimed in claim 8 further comprising the  
2     step of nulling in-phase bias.

1                   12.    The method as claimed in claim 11 wherein said step of  
2   nulling further comprises electronically coupling a torque component of said  
3   drive           axis           with           said           output           axis.

1                   13.    The method as claimed in claim 8 wherein said micro-  
2   gyroscope closed loop control further comprises:  
3                    using separate sensors and actuators for said step of correcting  
4   said misalignment and said step of correcting said residual mistuning.

1                   14.    The method as claimed in claim 8 wherein said step of  
2   correcting said misalignment further comprises the step of introducing an  
3   electrostatic cross-coupling spring,  $K_{xy}^e$  for canceling said misalignment.

1                   15.    The method as claimed in claim 14 further comprising  
2   the step of applying a bias voltage to a drive electrode on said drive axis that is  
3   different from a bias voltage to another drive electrode on said drive axis.

1                   16.    The method as claimed in claim 8 further comprising the  
2   step of introducing a relative gain mismatch,  $\delta_T \neq 0$ , to each drive electrode on  
3   said drive axis.

1                   17.    The method as claimed in claim 8 further comprising the  
2   step of maximizing a stiffness matrix  $K$ .

1                   18.    The method as claimed in claim 8 wherein said step of  
2   correcting said residual mistuning to zero further comprises adjusting a total  
3   stiffness of said micro-gyroscope.